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ABSTRACT

Intended to establish a philosophical base for the acquisition and utilization of computers for both administrative and instructional purposes, this paper begins by briefly describing instructional applications and listing the necessary elements of a computer literacy program. Administrative applications are discussed in terms of traditional business data processing, computer managed instruction, and information networking capability. Six recommendations are offered to help schools implement microcomputers into their ongoing programs. A sample curriculum design incorporates the developmental sequences of computer awareness, exploration, and specialization, and provides objectives as well as suggestions for implementation. An administrative model describes some possible areas of microcomputer use at both the school system and school building levels. A summary addresses concerns relating to computer utilization and implementation and the role of the State Department of Public Instruction as it provides leadership to local systems. (LMM)

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STATE PLAN FOR COMPUTER UTILIZATION IN NORTH CAROLINA PUBLIC SCHOOLS

North Carolina Department of Public Instruction
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STATE PLAN FOR COMPUTER UTILIZATION IN NORTH CAROLINA PUBLIC SCHOOLS

This paper is designed to establish a philosophical base for the acquisition and utilization of computers for both administrative and instructional purposes in the schools of North Carolina.

As an educational institution, the school has a set of unique needs with regard to computers. Administrators need ready access to information to improve the quality of administrative decision-making and to assist in the performance of routine tasks. Teachers need the assistance that computers offer in student record-keeping and other tasks not directly related to instruction which can free them to work more directly with students. Students need computer literacy skills, in addition to basic skills in reading, writing and mathematics, if they are to function effectively in the world for which they are preparing. It is also important for schools to provide students with career skills in the use of computers, to advise students about career opportunities, and to assist students in using computers to develop skills in analytical thinking and problem solving.

The microcomputer, as we know it today, has only been on the market since 1977, but it has changed the whole nature of thinking about computers as far as schools are concerned. Unlike the mainframe computer, its cost is low and steadily declining as new technologies increase its capacity while decreasing its size. A microcomputer is portable, uses a small amount of space, and is flexible in its possible uses. The amount of memory a microcomputer now has, or can add to its basic repertoire, exceeds the storage capacity of the giant mainframe computers that once filled entire rooms. So it is understandable why the microcomputer has been hailed as the most promising educational tool of the century.

INSTRUCTIONAL APPLICATIONS

Within the very near future, microcomputers will be commonplace appliances in homes, in schools and in the marketplace. In the school's instructional program, the micro will be used primarily as a tool which has tremendous potential for making competent, knowledgeable teachers even more effective.

In computer-assisted instruction (CAI), the computer has the ability to (1) individualize the instructional process, (2) simulate experiences not possible without a computer, and (3) provide immediate and systematized reinforcement.

Because microcomputers are self-contained units, they are subject to the control of the classroom teacher, and of the student, and may be used to enhance, enrich, and/or extend the instructional program. The computer is a powerful tool they will use to gather, organize, analyze, process and evaluate information. Students of today are growing up with computers, and they view computerization as providing a myriad of occupations, varied opportunities for easing personal responsibilities, and multiple recreational facilities. Thus, computer literacy must become a basic skill for them as well as for educators.

The term "Computer Literacy" has been severely overworked. Being computer literate does not necessarily mean understanding all of the complex workings of the machine and its related components. Rather, it means knowing how to use a computer for personal applications and how to recognize other potential uses for the machine.

Computer literacy programs will vary from school system to school system but the following elements should be included:

...activities to overcome negative attitudes or fears

...definitions of computer terms

...familiarity with basic components of a microcomputer

...what a computer and computer programs can and cannot do

...an introduction to computer programming

...sources of information about computers and computer software

...impact of computers on society

While many of the elements of a computer literacy program can be taught without access to a microcomputer, hands-on activities increase learner outcomes.

ADMINISTRATIVE APPLICATIONS

The potential uses of computers for administrative purposes can be grouped into three broad categories. The first category is described as traditional business data processing similar to that which exists in most large business

and commercial concerns. The second category is the management aspect of the instructional program including student data that has been traditionally collected and maintained by individual teachers as well as guidance counselors and other support personnel. The third category is the networking capability that can link individual schools to the system-level computer in addition to computers in other schools and agencies for information exchange and compilation of data. A major concern in all applications must be the preservation of privacy for those who provide, or are the subject of, the information.

The administrative use of computers in school districts and regions will improve the utilization of information which is currently compiled and distributed by less efficient means. Computer users will also create new administrative applications, many of which are difficult to anticipate. Some current applications that look promising for administrators include electronic mail, electronic conferencing, the electronic bulletin board, and the exchange and compilation of statistical data.

One of the impediments to the effective use of computers in schools is the tradition which surrounds many of the current manual practices. If computers are to have a positive impact on education, administrators must develop and implement administrative applications which are cost effective, time-saving, and convincing demonstrations of computer benefits to all interested groups.

RECOMMENDATIONS

To help schools implement microcomputers into their on-going programs for both administrative and instructional purposes, the following recommendations are offered. It is recommended:

(1) that before any hardware or software is acquired, that schools and school systems first develop an overall plan with input from all possible users as to short and long-range goals to be achieved.

(2) That schools and school systems establish a committee composed of teachers, media coordinators, administrators and other appropriate staff and community individuals to coordinate, promote and support the implementation of their plan.

(3) that, for instructional purposes, schools and school systems:
...support the use of the microcomputer as an instructional tool to be used in all content areas, at all grade levels, and by all instructional and support personnel.

...provide all students the opportunity to become familiar with the operation of a computer, to develop an awareness of the extensive use of computers in the world around them, and to acquire an understanding of the capabilities and limitations of computers.

...provide an integrated sequence of studies which incorporates computer awareness (K-5), computer exploration (6-9), and computer specialization (10-12) as students progress toward computer literacy.

...develop a cadre of qualified teaching personnel competent in computer operations, software evaluation and selection, integration of computer software into instructional program, and simple computer programming.

...and that each teacher be charged with the responsibility for appropriate use of microcomputer hardware and software and the integration of both into his/her existing classroom instructional program in accordance with the school and school system's plan.

(4) that, for administrative purposes, schools and school systems:

...require administrators to gain at least a minimal understanding of both the instructional and administrative uses of computers to enable them to make informed decisions, cope with problems and provide leadership in this new area of technology.

...establish guidelines for administrative uses of the microcomputer within the school system that will comply with state, regional and federal needs and requirements.

...coordinate the various administrative uses of computers within the school system in order to establish networks for data access and transfer.

(5) that teacher training institutions:

...develop and implement a plan that ensures that all future teachers, administrators, and other educators are computer literate.

...provide staff development opportunities designed for current educators to acquire needed skills in using the computer both as an instructional and management tool.

(6) that the Department of Public Instruction continue to provide leadership and seek to expand services to schools and school systems in the planning for and implementation of microcomputers in the instructional process and for administrative uses.

An Instructional Program Design Model

This sample curriculum design incorporates the developmental sequences of computer awareness, exploration, and specialization. Although grade level designations are suggested, the indicated sequence should be followed regardless of the level at which the use of microcomputers begins.

Computer Awareness (Grades K-5)

Objectives:

1. The student can describe the computer as a problem-solving machine.
2. The student can recognize and be familiar with computer words and computer parts -- their meaning and uses.
3. The student can identify the capability and limitations of computers and daily uses of computers.
4. The student can load and run programs.
5. The student can recognize several early computing devices and compare each to modern computers.
6. The student can use introductory commands of a computer language to create and control computer shapes or a program output.

Activities Involving:

1. Computer-assisted instruction utilizing programs written in the instructional modes of:
   A. simulations,
   B. drill and practice,
   C. tutorials.
2. Vocabulary and function for computer hardware and operation.
3. Introductory programming in LOGO or BASIC.
4. Examples of historical development of and societal uses of computers.

Implementation:

1. Computer-assisted instruction as part of all curriculum areas.
2. General societal information (historical development and applications) as part of all curricular areas.
3. Programming: Introductory for all students with extended opportunities depending on student interest and ability.

Computer Exploration (Grades 6-9)

Objectives:

1. The student can identify the three types (mainframe, mini, micro) of computers and describe the advantages of each.
2. The student can list computer and computer-using jobs and understand the job description and training for each.
3. The student can trace the historical development of computers and resulting societal effects.
4. The student can identify the common programming languages and their applications.
5. The student can operate a microcomputer: on-off sequences; program loading, saving and copying; and program output to a printer.
6. The students can modify and successfully run instructional programs for problem-solving applications.

Activities Involving:

1. Computer-assisted instruction utilizing programs written in the instructional modes of:
   A. simulations,
   B. drill and practice,
   C. tutorials,
   D. problem solving.
2. Computer hardware and software terminology, function and operation.

3. Complete historical development of computers; the hardware, capability of that hardware, and the people responsible for the development.

4. Study of occupations directly and indirectly involving computers, the activities involved in all directly-related jobs, and the training necessary to obtain such jobs.

5. Exploration of the applications within and effect on society of computers, particularly the microprocessor.

6. Awareness of the capabilities and limitations of computers.

7. Computer programming, using a language such as LOGO or BASIC and including:

   A. fundamental programming ideas,

   B. problem-solving program design activities,

   C. graphics,

   D. design of simple computer-assisted instructional programs.

Implementation:

1. Computer-assisted instruction as part of all curriculum areas.

2. Computer literacy unit (or semester course) that includes more programming as part of or as an elective.

3. Short awareness unit (exposure) for all students with opportunities for hands-on follow-up activities.

Computer Specialization (Grades 10-12)

Objectives:

1. The student can select and appropriately use programs to enrich and extend the regular course instruction.

2. The student can determine content topics appropriate for computer applications.

3. The student can modify and successfully run computer programs.

4. The student can use the microcomputer to gather, organize, analyze, process and evaluate information.

Activities Involving:

1. Computer-assisted instruction utilizing programs written in the instructional modes of:
   A. simulations,
   B. drill and practice,
   C. tutorials,
   D. problem solving.
2. Overview of computer development and applications appropriate to particular curriculum areas (e.g. business, math, science and others).
3. Computer programming and data processing techniques.

Implementation:

1. Computer-assisted instruction as part of all curriculum areas.
2. "Introduction to Computers" semester course especially for business students and for math-science oriented students.
3. Programming and data processing courses especially for business students and for math-science oriented students.

An Administrative Model

This suggested administrative model describes some possible areas of use of microcomputers at the school system as well as the school building level, including some concurrent uses. This model may be useful in designing a coordinated system-wide plan.

Possible Applications at the Central Office

- Financial Records and Purchasing
- Maintenance Services
- Certification/Personnel Data Base
- Staff Development
- Professional Materials Inventory and Circulation
- Word Processing/Mail Lists

Possible Concurrent Uses

- Child Nutrition
- Attendance
- Textbooks
- Substitute Teacher Data Base
- Community Schools Program

Possible Applications at the Building Level

- Scheduling
- Student Data Base
- Building Inventory
- Media Inventory and Circulation Systems
- Diagnostic and Prescriptive Programs
- Word Processing/Mail Lists
- Classroom Management
- Report Cards

SUMMARY

Computers have come to school! It is clear that this technological innovation has a significant role in education, both for the instructional program and the administration of the school. This document defines the phenomena, emphasizes the importance of planning, makes recommendations, and outlines a curriculum design as well as an administrative model.

As the development and use of microcomputers progresses, the State Department of Public Instruction will continue to provide leadership for assisting local systems with implementation strategies. Many examples of that leadership are evident already. Among them are the assistance provided through utilization workshops, hardware contracts, a hardware/software laboratory for evaluating materials and equipment, the development of staff development programs via open-air broadcast, and the technical consultant services both within the Agency and to local school systems.

Areas of effective utilization are constantly changing as appropriate hardware and software evolve. As the Department's curriculum study committees revise subject area curriculum guides to include additional competencies and skills, they will integrate the use of the computer into instruction in those areas. It is important that all areas know and use the tool in instruction and are aware of administrative and management possibilities.

Three elements need immediate attention. Resources for implementation must continue to be identified from existing as well as new funds as they become available. It is vital to strengthen the coordination of efforts of public schools, community and technical colleges, and colleges and universities in the use of computers in and for schools. Computers, while not a panacea to cure all ills, can be sound educational tools.

Moreover it is essential that all groups involved in the educational process be aware and informed of progress being made. Dialogue and communication networks must be developed and/or refined among educators, business and industry, and the general public.

Based on good judgment, there must be a concerted effort by the Department of Public Instruction, by school systems, and by affected groups to make this new technology available, relevant, useful, and effective for learning.